

MHT CET 2025 PCM 27 April Shift 2 Question Paper

Time Allowed :3 Hour

Maximum Marks :200

Total Questions :150

1. Evaluate the integral:

$$\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$$

- (A) $\frac{2}{\cos^2 x}$
(B) $\frac{2}{\sin^2 x}$
(C) $\frac{2}{\cos x}$
(D) $\frac{2}{\sin x}$
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2. Population of Town A and B was 20,000 in 1985. In 1989, the population of Town A was 25,000, and Town B had 28,000. What will be the difference in population between the two towns in 1993?

- (A) 5950
(B) 6950
(C) 4500
(D) 0
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3. A die was thrown n times until the lowest number on the die appeared. If the mean is $\frac{n}{g}$, then what is the value of n ?

- (A) 2
(B) 3
(C) 4
(D) 5
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4. There are 6 boys and 4 girls. Arrange their seating arrangement on a round table such that 2 boys and 1 girl can't sit together.

- (A) $6! \times 4!$
(B) $6! \times 3! \times 4!$
(C) $5! \times 4!$
(D) $5! \times 3! \times 4!$
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5. Choose a randomly selected leap year, in which 52 Saturdays and 53 Sundays are to be there. Given the following probability distribution:

x	1	2	3	4
$p(x)$	0.1	0.2	0.3	0.4

Find the mean and standard deviation.

- (A) Mean = 2.7, Standard Deviation = 1.5
(B) Mean = 2.5, Standard Deviation = 1.2
(C) Mean = 2.4, Standard Deviation = 1.4
(D) Mean = 3.0, Standard Deviation = 1.6
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6. If $\tan^{-1}(\sqrt{\cos \alpha}) - \cot^{-1}(\cos \alpha) = x$, then what is $\sin \alpha$?

- (A) $\tan\left(\frac{x}{2}\right)$
(B) $\cot\left(\frac{x}{2}\right)$
(C) $\cot^2\left(\frac{x}{2}\right)$
(D) $\tan^2\left(\frac{x}{2}\right)$
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7. If $\tan(\pi \cos x) = \cot(\pi \sin x)$, then what is $\sin\left(\frac{\pi}{2} + x\right)$?

- (A) $\frac{1}{2}$
(B) $\frac{1}{\sqrt{2}}$
(C) $-\frac{1}{2}$
(D) $-\frac{1}{\sqrt{2}}$
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8. Evaluate the integral:

$$\int \frac{1}{\sin^2 2x \cdot \cos^2 2x} dx$$

- (A) $\frac{1}{2} \tan 2x$
 - (B) $\frac{1}{2} \cot 2x$
 - (C) $\frac{1}{4} \cot 2x$
 - (D) $\frac{1}{4} \tan 2x$
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9. Given the equation:

$$81 \sin^2 x + 81 \cos^2 x = 30$$

Find the value of x .

- (A) $x = \frac{\pi}{4}$
 - (B) $x = \frac{\pi}{6}$
 - (C) $x = \frac{\pi}{3}$
 - (D) $x = \frac{\pi}{2}$
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10. The angle between the lines whose direction cosines satisfy the equations:

$$l + m + n = 0 \quad \text{and} \quad m^2 + n^2 - l^2 = 0$$

Find the angle between the two lines.

- (A) 30°
 - (B) 45°
 - (C) 60°
 - (D) 90°
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11. Let a , b , and c be vectors of magnitude 2, 3, and 4 respectively. If: - a is perpendicular to $(b + c)$, - b is perpendicular to $(c + a)$, - c is perpendicular to $(a + b)$, then the magnitude of $a + b + c$ is equal to:

- (A) 29
 - (B) $\sqrt{29}$
 - (C) 26
 - (D) $\sqrt{26}$
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12. A boy tries to message his friend. Each time, the chance the message is delivered is $\frac{1}{6}$, and the chance it fails is $\frac{5}{6}$. He sends 6 messages. Find the probability that exactly 5 messages are delivered.

- (A) $\frac{1}{6}$
 - (B) $\frac{5}{6}$
 - (C) $\binom{6}{5} \left(\frac{1}{6}\right)^5 \left(\frac{5}{6}\right)$
 - (D) $\frac{5}{36}$
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13. Given that $\cot\left(\frac{A+B}{2}\right) \cdot \tan\left(\frac{A-B}{2}\right) =$, and the equation $\frac{x}{2} + \frac{y}{3} + \frac{z}{6} - 1 = 0$, find the area of $\triangle ABC = 2$.

- (A) 2
 - (B) 3
 - (C) 4
 - (D) 5
-

14. Evaluate the following integrals:

$$\int \frac{(x^4 + 1)}{x(2x + 1)^2} dx$$

and

$$\int \frac{1}{x^4 + 5x^2 + 6} dx$$

- (A) $\frac{1}{(2x+1)}$
 - (B) $\frac{1}{(x^4+5x^2+6)}$
 - (C) $\frac{1}{2} \left(\ln \left| \frac{x^2+3}{x+2} \right| \right)$
 - (D) $\frac{1}{3} (\ln |x^2 + 5x + 6|)$
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15. Given that:

$$\cot\left(\frac{A+B}{2}\right) \cdot \tan\left(\frac{A-B}{2}\right)$$

and the equation involving coordinates:

$$\frac{x}{2} + \frac{y}{3} + \frac{2}{6} - 1 = 0$$

Find the area of $\triangle ABC = 2$.

- (A) 2
 - (B) 3
 - (C) 4
 - (D) 5
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